

IN THE CLAIMS

This listing of claims will replace all prior versions and listing of claims in the application:

Listing of Claims:

1-4. (Cancelled)

5. (Currently Amended) An apparatus for determining a state of a measurable circuit element having a plurality of states and a different impedance in each state, comprising:

a replicate circuit having a replicate circuit element and configured to generate a first test current through the replicate circuit element, the replicate circuit element having similar electrical characteristics as the measurable circuit element; and

a trim determination circuit coupled with the replicate circuit, the trim determination circuit including the measurable circuit element and configured to generate a second test current dependent on the first test current through the measurable circuit element. The apparatus as claimed in claim 3, wherein the trim determination circuit has further including a scaled reference current source for generating a scaled reference current and a dependent measurable current source coupled with the scaled reference current source for generating a measured current whereby the amount of the measured current is a function of the a first voltage drop across the measurable circuit element and the state of the measurable circuit element is determined by the difference between the scaled reference current and the measured current.

6. (Currently Amended) The apparatus as claimed in claim 35, wherein the replicate circuit includes a threshold current source for supplying a threshold current that is proportional to dependent on a voltage drop across the replicate circuit element, an adjustable test current source coupled with the replicate circuit element and the threshold current source for establishing a feedback and for supplying the adjustable first test current within the feedback and a reference current source coupled with the threshold current source for supplying a reference current whereby the difference between the reference current and the threshold current is zero when the first test current stabilizes at a certain

value provides the feedback to the adjustable current source and dictates the level of the adjustable current source.

7-22. (Cancelled)

23. (Currently Amended) An apparatus for improving the accuracy of a circuit comprising a test current source for generating a test current, a measurable element coupled with the test current source for receiving the test current so as to result in a first voltage drop across the measurable element, a dependent measurable current source for generating a measurable current dependent on the first voltage drop across the measurable element, a scaled reference current source coupled with the dependent measurable current source for generating a scaled reference current and defining a measurable voltage between the dependent measurable current source and the scaled reference current source that is dependent on the difference between the measurable current and the scaled reference current, ~~a replicate element coupled with the adjustable test current source for receiving the adjustable current so as to result in a second voltage drop across the replicate element, whereby a comparison between the second voltage drop and the first voltage drop indicates the measurable voltage indicating a state of the replicate element .~~

24. (Currently Amended) The apparatus as claimed in claim 23, further comprising an adjustable test current source for generating an adjustable test current that is mirrored by the test current source to generate the test current, a replicate element coupled with the adjustable test current source for receiving the adjustable test current, the adjustable test current source receiving a feedback for adjusting ~~the~~ a second voltage drop across the replicate element.

25. (original) The apparatus as claimed in claim 24, further comprising a dependent threshold current source for supplying a threshold current dependent upon the second voltage drop across the replicate element.

26. (original) The apparatus as claimed in claim 25, further comprising a reference current source coupled with the adjustable current source for supplying a reference current.

27. (original) The apparatus as claimed in claim 26, wherein the dependent threshold current source couples with the reference current source whereby the difference

between the threshold current and the reference current dictating adjustments in the adjustable test current.

28. (Currently Amended) An apparatus for improving the accuracy of a circuit, comprising a measurable circuit element having a plurality of states with a different impedance in each state whereby a test current received by the measurable circuit element results in a first voltage drop across the measurable element, a first amplifier having first and second inputs, the measurable ~~device~~ element being coupled with the first input of the first amplifier for providing the first input with a measured voltage ~~proportional to dependent on~~ the first voltage drop, and a first sense voltage being supplied to the second input of the first amplifier, the first amplifier being configured to generate a first amplifier output ~~proportional to dependent on~~ the difference between the measured voltage and the first sense voltage, an adjustable test current source for generating an adjustable test current, a replicate element coupled with the adjustable test current source for receiving the adjustable test current so as to result in a second voltage drop across the replicate element whereby ~~the second voltage drop is proportional to the first~~ a voltage at one terminal of the replicate element is compared with a second sense voltage to provide a feedback to adjust the adjustable test current, and so that the first amplifier output indicates a comparison between the first sense voltage and the measured voltage to identify one state of the plurality of states the state of the measurable element.

29. (Currently Amended) The apparatus as claimed in claim 28, ~~further comprising an adjustable test current source for generating an adjustable test current, a replicate element coupled with an adjustable test current source for receiving the adjustable test current resulting in a second voltage drop across the replicate element producing a replicate voltage, whereby the adjustable current is dependent on the replicate voltage~~ wherein the test current is dependent on the adjustable test current.

30. (Cancelled)

31. (Currently Amended) The apparatus as claimed in claim 28, ~~for use with a second sense voltage and further comprising a second amplifier having a first and second input, the first input of the second amplifier~~ couples being coupled with the replicate element for receiving a first input voltage ~~proportional to dependent on~~ the second voltage drop across the replicate element, the second sense voltage being supplied to the second

input of the second amplifier, the second amplifier being configured to generate a second amplifier output proportional todependent on the difference between the first input voltage and the second sense voltage, and the adjustable test current source couplesbeing coupled with the second amplifier and receiving the second amplifier output so that the for controlling the level of the adjustable test current is stabilized when the first input voltage equals the second sense voltage.

32 – 40 (cancelled)

41. (Currently Amended) An apparatus according to claim 16, wherein the replicate circuit element includes an untrimmed zener diodesecond test current is mirrored from the first test current and the scaled reference current is scaled from the reference current.

42. (Currently Amended) An apparatus according to claim 315, wherein the measurable circuit element includes a zener diode and the plurality of states include a trimmed state and an untrimmed state.

43. (Currently Amended) An apparatus according to claim 115, wherein the replicate circuit element includes an untrimmed Zener diode.

44. (Currently Amended) An apparatus according to claim 4323, wherein the measurable circuit element includes a zener diode and the plurality of states include a trimmed state and an untrimmed state.

45. (Currently Amended) An apparatus according to claim 2344, wherein the replicate circuit element includes an untrimmed zener diode.

46. (Currently Amended) An apparatus according to claim 4528, wherein the measurable circuit element includes a zener diode and the plurality of states include a trimmed state and an untrimmed state.

47. (Currently Amended) An apparatus according to claim 2846, wherein the replicate circuit element includes an untrimmed zener diode.

48. (Currently Amended) An apparatus according to claim 4728, wherein the measurable circuit element includes a zener diode and the plurality of states include a trimmed state and an untrimmed statefirst sense voltage is equal to the second sense voltage.

49. (New) An apparatus for determining a state of a measurable circuit element having a plurality of states and a different impedance in each state, comprising:

a first circuit including a replicate circuit element having similar characteristics as the measurable circuit element, the first circuit being configured to generate a first test current through the replicate circuit element; and

a second circuit coupled with the first circuit and including the measurable circuit element, the second circuit being configured to generate a second test current dependent on the first test current through the measurable circuit element to result in a voltage drop across the measurable circuit element, the second circuit further being configured to generate a measured current dependent on the voltage drop and to output a voltage dependent on the difference between the measured current and a scaled reference current to indicate the state of the measurable element.

50. (New) The apparatus of claim 49 further comprising an inverter coupled to the second circuit for receiving the voltage output from the second circuit to generate an output of "high" or "low" depending on the state of the measurable circuit element.

51. (New) The apparatus of claim 50 wherein the first circuit is further configured to generate a threshold current depending on a voltage drop across the replicate circuit element and a reference current whereby the first test current is stabilized at a certain value when the threshold current is equal to the reference current.

52. (New) The apparatus of claim 50 further comprising a first test current source for generating the first test current, a reference current source for generating the reference current, and a threshold current source for generating the threshold current, the first test current source, the reference current source, the threshold current source and the measurable circuit element being interconnected in a feedback loop such that the first test current is stabilized at a certain value when the threshold current is equal to the reference current.

53. (New) The apparatus of claim 52 further comprising a measured threshold current source for generating the measured current and a scaled reference current source serially coupled with the measured threshold current source for generating the scaled reference current wherein the voltage is output from a circuit node between the measured

threshold current source and the scaled reference current source to indicate the state of the measurable circuit element.

54. (New) The apparatus of claim 53 wherein the first current source is implemented using a first test current transistor, the threshold current source is implemented using a threshold transistor, and the reference current source is implemented using a reference transistor, a source of the first test current transistor being connected to a first terminal of the replicate circuit element and to a gate of the threshold transistor, a gate of the first test current transistor being connected to the drain of the threshold transistor and to the source of the reference transistor, a source of the threshold transistor being connected to a second terminal of the replicate circuit element.

55. (New) The apparatus of claim 54 further comprising a mirror transistor serially connected with the first test current transistor.

56. (New) The apparatus of claim 54 wherein the second current source is implemented using a second test current transistor, the measured current source is implemented using a measured threshold transistor, and the scaled reference current source is implemented using a scaled reference transistor serially connected with the measured threshold transistor, a source of the second test current transistor being connected to a first terminal of the measurable circuit element and to a gate of the measured threshold transistor, a gate of the second test current transistor being connected to the first circuit, a source of the measured threshold transistor being connected to a second terminal of the measured circuit element

57. (New) The apparatus of claim 51 wherein the scaled reference current is scaled from the reference current.

58. (New) The apparatus of claim 53 wherein the scaled reference current is a predetermined fraction of the reference current.

59. (New) The apparatus of claim 49 wherein the measurable circuit element is a Zener diode having a trimmed or untrimmed state to be determined by the apparatus.

60. (New) An apparatus for determining a state of a measurable circuit element having a plurality of states and a different impedance in each state, comprising:

a first circuit including a replicate circuit element having similar characteristics as the measurable circuit element, the first circuit being configured to generate a first test current through the replicate circuit element, the first test current being stabilized when a

voltage at one terminal of the replicate circuit element is equal to a first reference voltage; and

a second circuit coupled with the first circuit and including the measurable circuit element, the second circuit being configured to generate a second test current dependent on the first test current through the measurable circuit element and to generate an output dependent upon the difference between a measured voltage at one terminal of the measurable circuit element and a second reference voltage associated with the first reference voltage, the output indicating the state of the measurable element.

61. (New) The apparatus of claim 60 wherein the second reference voltage is proportional to the first reference voltage.

62. (New) The apparatus of claim 61 wherein the second reference voltage is equal to the first reference voltage.

63. (New) The apparatus of claim 60 wherein the second circuit outputs a "high" or "low" depending on the state of the measurable circuit element.

64. (New) The apparatus of claim 60 wherein the second test current is equal to the first test current.

65. (New) The apparatus of claim 64 wherein the second test current is a multiple of the first test current.

66. (New) The apparatus of claim 60 further comprising a first current source serially connected with the replicate circuit element for generating the first test current, a first amplifier having a first input connected to the one terminal of the replicate circuit element, a second input connected to the first reference voltage, and an output connected to a control terminal of the first current source.

67. (New) The apparatus of claim 66 wherein the first current source is implemented using a transistor and the control terminal is the gate of the transistor.

68. (New) The apparatus of claim 67 further comprising a second current source serially connected with the measurable circuit element for generating the second test current, a second amplifier having a first input connected between the measurable circuit element and the second test current, and a second input connected to the second reference voltage.

69. (New) The apparatus of claim 68 further comprising an inverter coupled to an output of the second amplifier, the inverter outputting a "high" or "low" depending on the state of the measurable circuit element.